

CLAIMS

1. A signal generator (2) for generating a pulse width modulated signal, comprising:

5 matched reference (4) and modulation (6) ramp circuits, each including a current source (8, 32), a capacitance (10) arranged to be charged by the current output from the current source (8, 32), a switch (24) for discharging the capacitance, and a voltage detector (18) for detecting a predetermined charge on the capacitance;

10 wherein the output (22) of the voltage detector (18) of the reference ramp circuit (4) controls the switch (24) of both the reference (4) and the modulation ramp circuits (6); and

15 the output (32) of the voltage detector (18) of the modulation ramp circuit (6) is connected to an output (30) for providing the pulse width modulated signal.

2. A signal generator according to claim 1, wherein
in each of the measurement and modulation ramp circuits the current source (8, 32) is connected to the capacitance (10) at a measurement node (16); the voltage detector (18) has a sense input (20) and an output (22) with the sense input (20) being connected to the measurement node (16), for detecting the voltage on the measurement node (16) and outputting a control signal on the output (22) under predetermined conditions; the switch (24) is arranged across the capacitance (10); and the switch (24) has a control input (28), the switch being arranged to be closed by a signal on the control input (28) for discharging the capacitance in response to the control signal;

25 the capacitance (10), voltage detector (18) and switch (24) of the reference (4) and modulation (6) ramp circuits are matched; and

30 the control output (22) of the voltage detector (18) on the reference ramp circuit (4) is connected to the control input (28) of the switches (24) of both the reference (4) and modulation (6) ramp circuits.

3. A signal generator according to claim 1 or 2 wherein the current source (8) of the reference ramp circuit (4) is a fixed current constant current source (32) and the current source of the modulation ramp circuit (6) is a modulated current source having a control input for controlling the output 5 constant current, and in turn for controlling the percentage of time the output is on.

4. A signal generator according to any preceding claim wherein the switch (24) in each ramp circuit is a transistor having controlled terminals (26) 10 connected across the capacitance and the control terminal (28) connected to the output of the voltage detector of the reference ramp circuit.

5. A signal generator according to any preceding claim wherein the modulation (6) and reference (4) ramp circuits are integrated on a single 15 semiconductor substrate (70).

6. A switching dc-dc converter circuit comprising a dc input (40, 42); a dc output (60, 62); a signal generator (2) according to any preceding claim; and a switching module (72) connected between the dc input and the dc 20 output and containing at least one switch (46) controlled by the output of the voltage detector of the modulation ramp circuit of the signal generator (2) to convert an input dc voltage into an output dc voltage.

7. A power switching device according to claim 6 further comprising 25 a device package (66) including the signal generator (2) and at least one power transistor switch (46).

8. A power switching device according to claim 6 or 7 comprising first (46) and second (48) power transistors wherein the signal generator (2) is 30 arranged to switch on the first power transistor (46) only when the second transistor (48) is switched off and to switch on the second transistor (48) only when the first transistor (46) is switched off.

9. A method of generating a control signal for a pulse width modulator, including:

5 providing matched reference (4) and modulation (6) ramp circuits; each of the first and second ramp circuits (4, 6) including a current source (8, 32), a capacitance (10) arranged to be charged by the current output from the current source; a switch (24) for discharging the capacitance, and a voltage detector (18) for detecting a predetermined charge on the capacitance;

10 driving a constant current to charge the capacitance (10) of the reference ramp circuit;

supplying a modulated current to charge the capacitance (10) of the modulation ramp circuit (6);

15 detecting in the voltage detector (18) in each ramp circuit (4, 6) when the voltage across the respective capacitance (10) exceeds a predetermined value;

20 outputting a control signal from the voltage detector (18) in the reference ramp circuit (4) to the inputs of the switches (24) in both modulation and reference ramp circuits (4, 6) to discharge the capacitance (10) when the voltage across the capacitance in the reference ramp circuit exceeds the predetermined value; and

outputting the signal from the voltage detector (18) in the modulation ramp circuit (6) as the control signal for a pulse width modulator.

25 10. A method according to claim 9 further including adjusting the modulated constant current to vary the percentage of time the output is on.